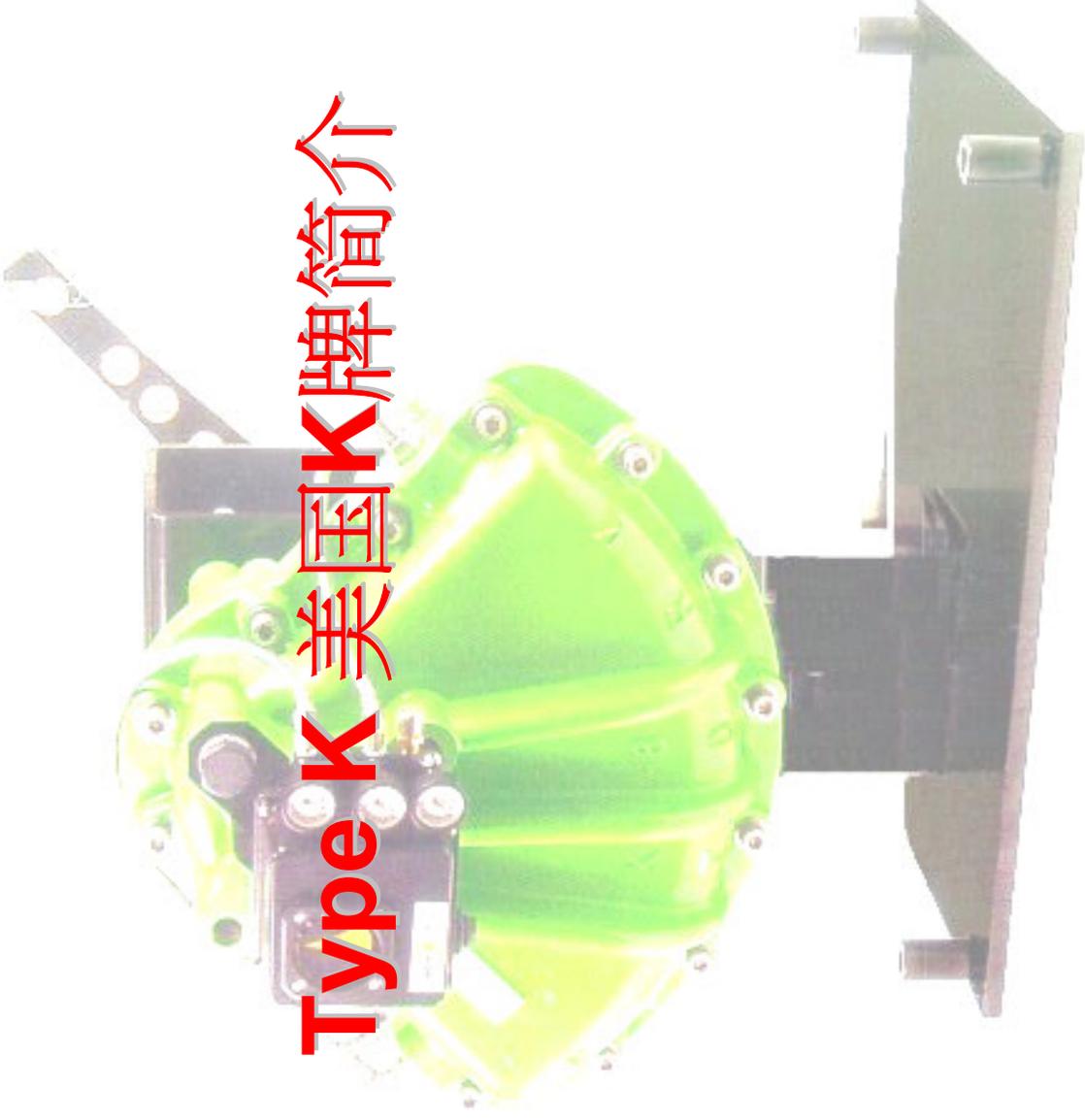




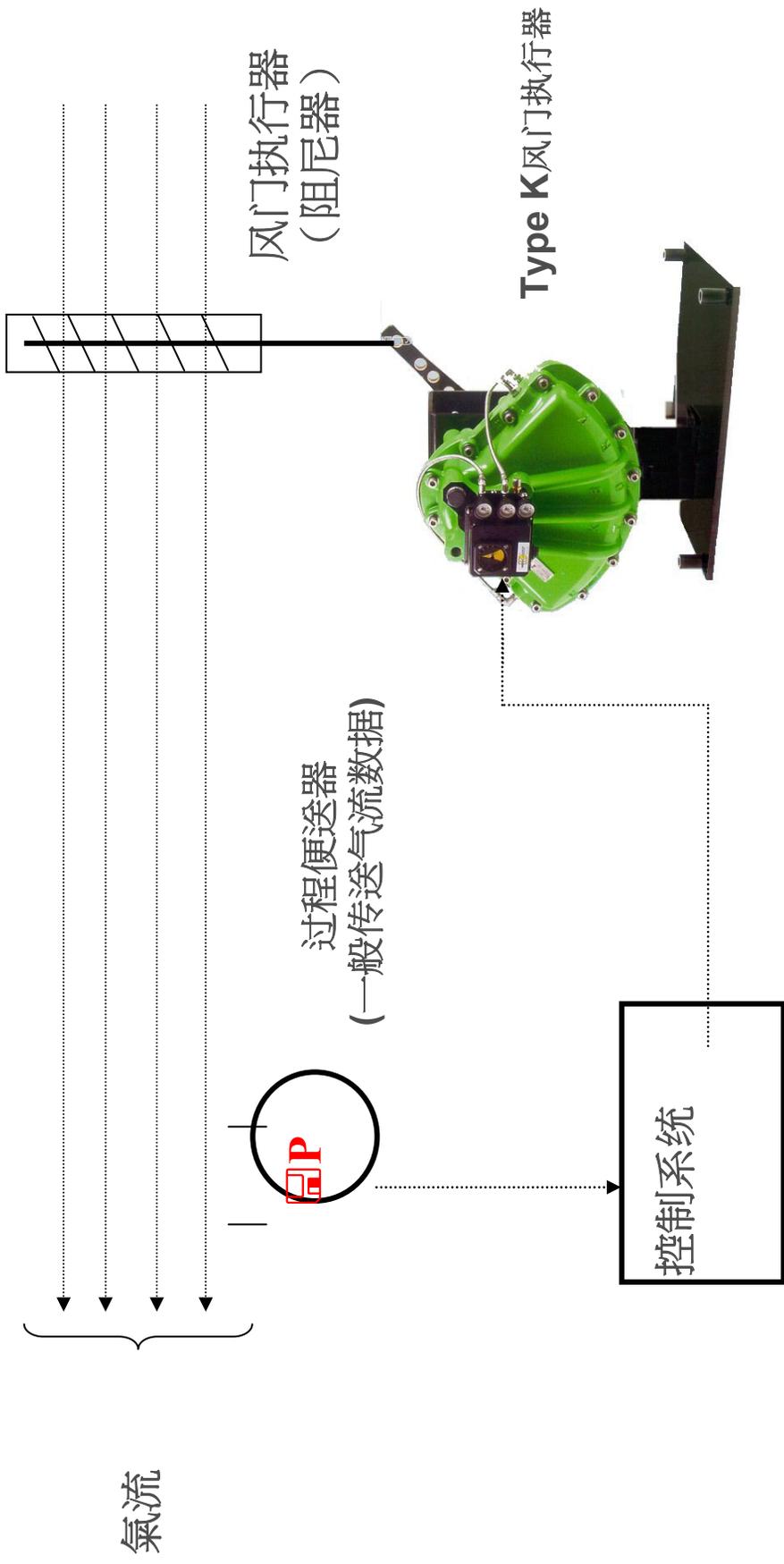
Type K—World Leader in Pneumatic Damper Drive Technology

美国K牌—世界领先压缩空气风门执行器技术

Type K 美国K牌简介



风门执行器有什么作用呢？



Type K 风门执行器构造

C-400 位置调整器

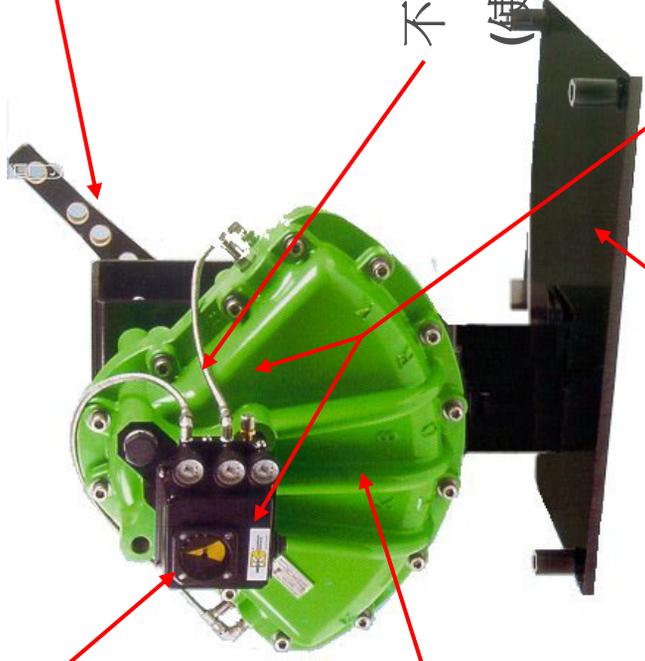
安照客户要求订作执行器之控制杆

K-TORK 执行器
(独有产品)

不锈钢筒和连接配件
(使用寿命长, 保养少)

安照客户需要专门制造特殊相配仪器柱脚和底座) (能配上原有连接底座)

NEMA 4X 安全生产
(污物和液体不会透入)



K牌风门执行器有哪些优势？

- 可以更准确控制。根据操作员的
要求 <math>< 0.5\%</math> 信号范围
- 在 150°C 气温环境照样使用良
好. (特殊材料可高达 300°C)
- 运转稳定。风门连杆不会左右
摇。
- 三年 4,000,000 使用次全面保证
- 能上百万使用周期正常使用并不
须要操作员之监督。

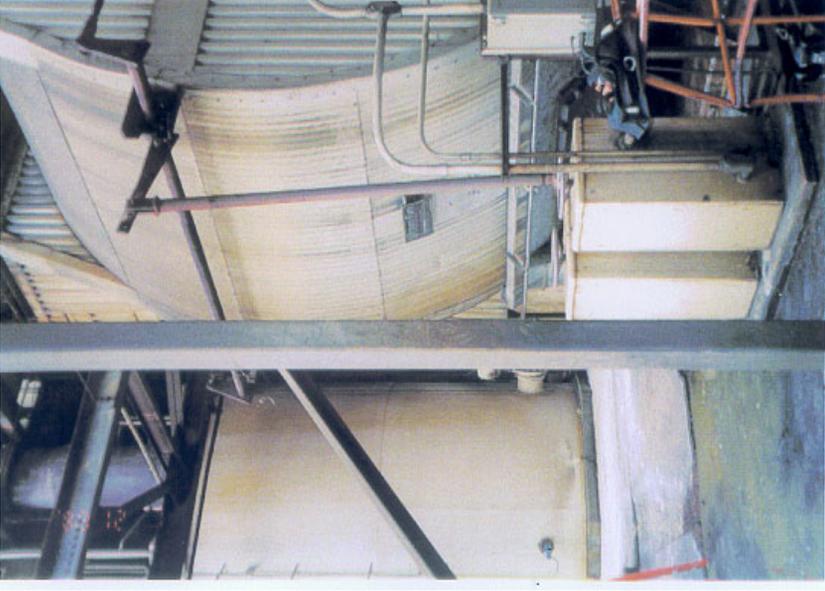


Type K风门执行器 —应用在送风机以及抽风机（F.D & I.D）—

- ▶ 转矩高达 $>14,124$ N-m
- ▶ 快速反应, 1.1 (米/秒)
- ▶ 根据不同进气需要快速调整阻尼器之位置反应 $<0.5\%$ 信号范围
- ▶ 改善锅炉压力控制
- ▶ 数字或模拟控制
- ▶ 降低保养费



一般风机设置



改进前—旧行圆筒式执行器



改进后—Type K 安装在原底座接原有的连接装置

一般磨煤器用的风门执行器安装



改良过前—就型缸式执行器。



改良过后—带电子输入和位置反馈

Type K 风门执行器—燃烧机高低位置调整器

- 几种安装方式.
- 耐高温机械.
- 压缩空气或电子输入.
- 带位置反馈和极限开关.
- 简便安装.



TXU, Big Brown Station
Type K Burner Tilt Drive

Type K风门执行器 ——风箱应用——

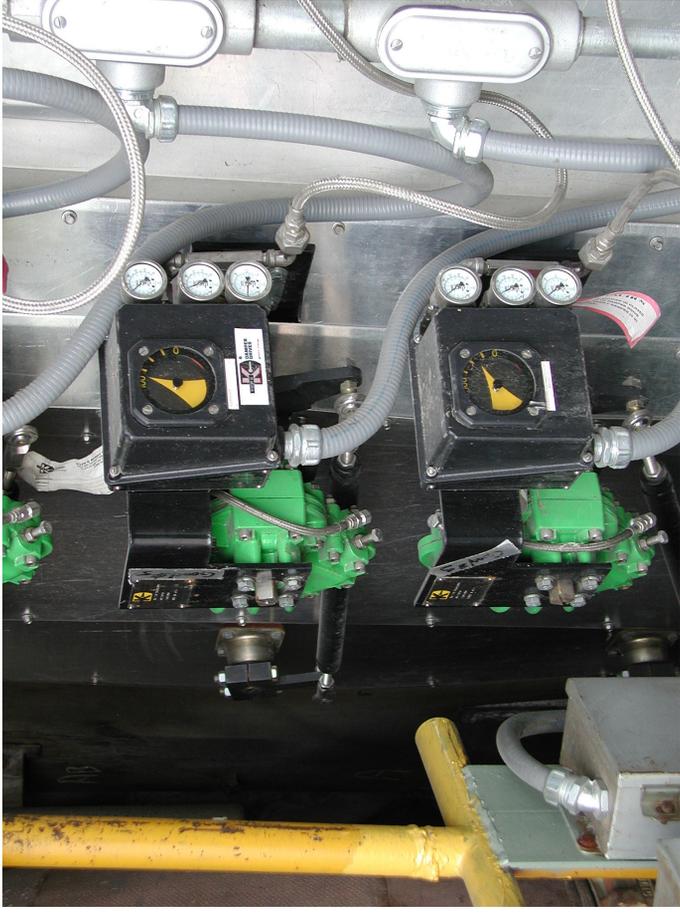
- 改进风箱操作
- 适合高温环境实用
- 可以实用气压或电子输入
- 内装位置反馈, 和极限开关.
- 减少废气量



一般风箱安装情况



安装前—有压缩空气输入没有输出原廠汽缸式風門執行器



安装后—有电子输入输出Type K风门执行器

切向锅炉（四角对吹）应用 ——风箱经验——

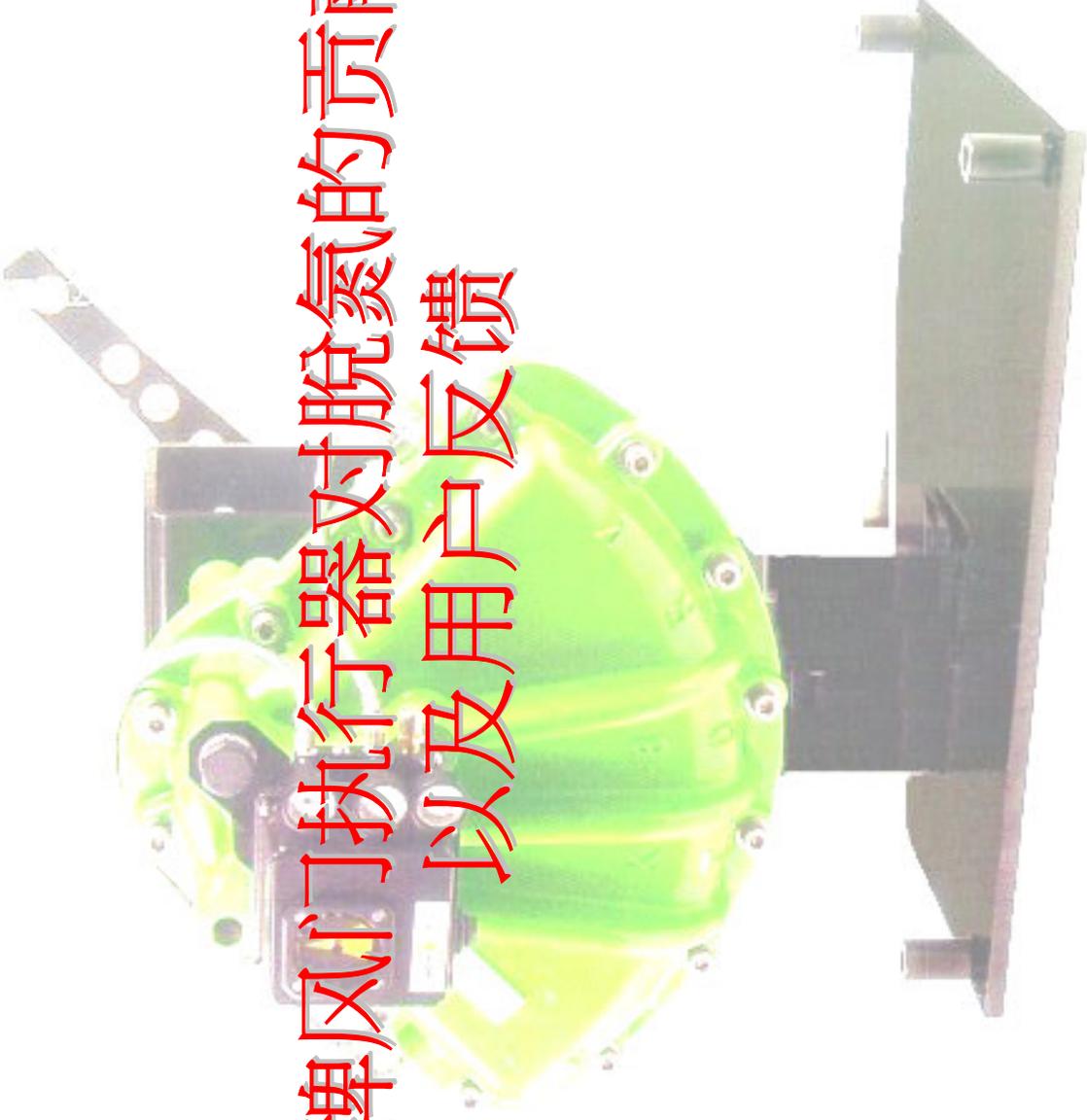
- 曾经装过几千个该锅炉之传动机。
- 占本公司传动机之 **50%** 销售额。
- 为了应付切向锅炉厂之需要**K牌**免费提供周全安装设计服务。
- 耐高温制造保证长年良好操作。
- 电子输入和位置反馈给予良好个别角落控制。



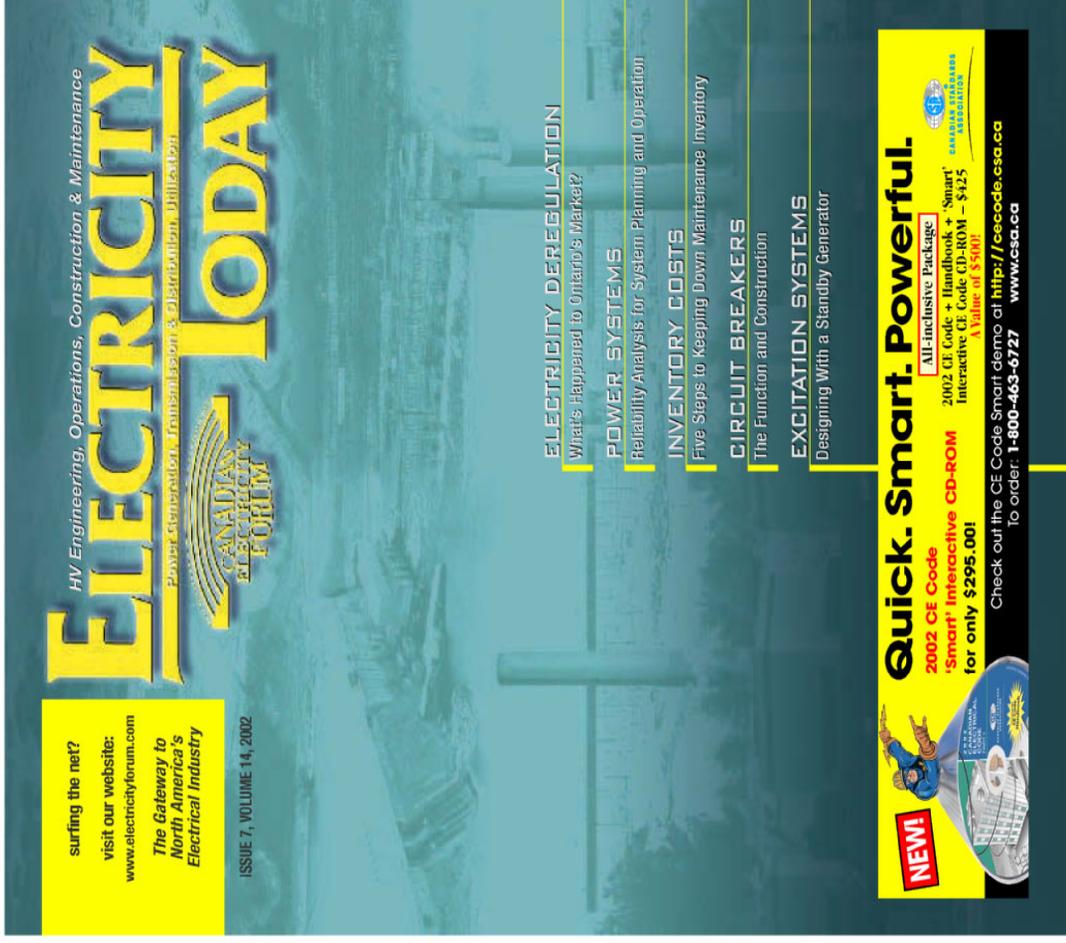
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K牌风门执行器对脱氮的贡献 以及用户反馈



加拿大今日雷力雜誌 (2002年)



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ISSUE 7, VOLUME 14, 2002

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The Importance of Damper Drive Performance For Clean Air

By: Kevin Wistrom

Because of the 1990 Amendments to the Federal Clean Air Act, petroleum refineries and other industries throughout the country are now forced to examine every aspect of their process-heating operations in order to reduce cumulative nitrogen oxides (NOx) emissions from their plants. While aging furnace burners are already rapidly being replaced with newer low NOx burners, attention is now being directed toward the furnace and heater stack damper drives.

Changing the final damper control elements to more reliable and accurate damper drives greatly improves the combustion of air and flue gases and reduces air leakage during start-ups. The resulting efficiency (depending on the type of low NOx burner selected and on how "tight" the furnace is for leaks can lower emissions as much as 55 to 80 per cent, when used in combination with other low NOx strategies while potentially increasing profit margins from two to eight per cent per furnace from fuel savings alone.

An Industry-Wide Issue With Inescapable Deadlines

In 1998, the US Environmental Protection Agency (EPA) refused the Act's amendments into the National Emission Standards for Hazardous Air Pollutants from Petroleum Refinery

Vents (referred to as Refinery MACT-II), which cover emissions from catalytic cracker, catalytic reformer and sulfur plants.

These rules were promulgated in late 2000 and have now officially impacted the majority of refineries throughout the country. Some areas of the country have until 2008 to fully meet emissions targets, but the EPA has already teamed up with the US Department of Justice to force multi-million dollar emission-reduction deals with major oil producers throughout the country.

At the state and local level, deadlines from even closer, California's Rule 1109 demands that refinery emissions not exceed 0.3 pounds (0.14 kilograms) of NOx per million BTUs of heat input when operated on liquid fuel in the San Francisco area of the state, this target was to be met by July 1.

"The consequences of these deadlines are severe," says Don Nelson, a NOx Project Engineer for ConocoPhillips Engineering with 30 years experience in the petroleum refining and production industry. "You either comply or you shut the high NOx producing furnaces down. You cannot count on deviations or variances," Nelson is currently doing contract work for a major refinery near San Francisco Bay.



Reheat Before

Reheat After

Strategies For Reducing Emissions
Thermal NOx is a result of the thermal fixation of molecular nitrogen and oxygen present in the combustion air. NOx emissions increase rapidly at peak flame temperatures exceeding 1540°C (2800°F) and with the increasing duration of time that the reactants remain within the area of peak flame.

"The more oxygen in the eye of the flame, the more NOx you make," observes Nelson. "The industry norm is to burn with a residual three per cent oxygen going out the stack. More than that and you increase emissions. Plus, your burn becomes less efficient."

One of the more common methods to lower NOx emissions is the installation of low NOx burners (LNB) and flue gas recirculation (FGR). According to EPA technical document number 453/R-93-034 (which identifies alternative controls for NOx emitters) FGR, combined with LNBs can lead to total NOx reductions of 55 per cent over uncontrolled emissions.

State of the art burners spin the flame and induce recirculation of nearby flue gases inside the firebox thereby cooling the peak flame temperature. Nelson has worked closely with burner vendors to perfect this technique, while still allowing the burner parts to be manufactured economically.

FGR operates to reduce O2 usage by forcing the return of flue gas to the burners. By recycling 15 to 30 per cent of the inert products of combustion to the primary combustion zone, the reactants are diluted. This reduces the peak flame temperature, reduces local oxygen concentrations to levels below those per cent and inhibits thermal NOx formation.

"For this technique to work optimally, you need precise damper control to maintain a slight negative draft inside the firebox," says Nelson. "For this reason, every time you put in a new burner, you should consider installation of precision damper drives, linkages, damper blades, bearings, etc. to effect smooth control of the draft. Even with selective

风门执行器对改善工业炉子，锅炉的作用

Because of the 1990 Amendments to the Federal Clean Air Act petroleum refineries and other industries are now forced to examine every aspect of their processing operations in order to reduce cumulative nitrogen oxide emissions. While ageing furnace burners are already rapidly being replaced with newer low NOx burners, attention is now being directed toward the furnace and heater stack damper drives.

因为1990联邦政府修改“干净空气法案”炼油厂等工业被逼下很大的功夫考虑他们生产过程的每一个步骤来降低氧化氮总排量。很多炉子的老燃烧机被新的低氮燃烧机替换，现在很多工业开始注意炉子和烟囱风门执行器。



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風門執行器對改善工業爐子，鍋爐的作用

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to more reliable and accurate damper
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将最终风门调解系统换成更可靠更准确的
风门执行器大副改进空气和烟气的
燃烧...

風門執行器和燃氣再迴圈技術(FGD)

One of the more common methods to lower NOx emissions is a combination of low-NOx burners (LNBS) and flue gas recirculations (FGR).

燃气再循环技术(FGD)和低氮燃烧器共同使用是美国比较普遍的降氧化氮方式。

風門執行器和燃氣再迴圈技術(FGR)

According to EPA technical document number 453/R-93-034, which identifies alternative controls for NOx emitter, FGR combined with LNBs can lead to total NOx reductions of 55% as compared to uncontrolled emissions. (Some reports say up 80%.)

根据美国环保署453/R-93-034技术文件提出的几个氧化氮控制方法，燃气再循环技术(FGD)配上低氮燃烧器，比其不上任何氧化氮的措施能得到55%降排量的作用。（其它报导表达有80%降量的成就。）

加拿大今日電力雜誌（2002年）

Quotations from:

Don Nelson, NOx project engineer
ConneXsys Engineering

以下的引文由：

康奈斯公司氧化氮控件目工程师
唐纳德·奈络生

风门执行器和燃气再循环技术(FGR)

"For this technique to work optimally, you need precise damper control to maintain a slight negative draft inside the firebox. For this reason every time you put in a new burner, you should consider installation of precision damper drives, linkages, damper blades, bearings, etc. to effect smooth control of the draft. "

为了保证这个方法有效实行，燃烧箱需要维持低度负压，因此准确风门控制很重要。每次更换燃烧机，用户应该同时考虑换准确风门执行器，连接装置，风门执行器和燃气再循环技术(FGR)风门叶片，轴承等等来保证供气的稳定性。

风门执行器和燃气再循环技术(FGR)

" Even with selective catalytic reduction (SCR) techniques, controlling the flue gas environment is essential. Accurate damper drives permit this control. "

"假如工厂已经上了挑选是催化器技术（SCR）控制供气环境还是很重要。准确风门执行器对SCR技术还是很重要。"

炉子气流供应和执行器

"Sometimes excess oxygen gets into the burner because many older furnaces have cracks and leaks from overuse, rust and damage from past explosions."

“因为古老炉子经常曾经发生过爆炸和生锈所带来的破坏，这些设备通常都会有裂痕和漏洞。因此多余的氧气容易进入燃烧机。”

炉子气流供应和执行器

“Cold O₂ leaks in, falls to the bottom of the furnace, heats up the flame and creates excess NO_x. Because you can never get all the leaks out, you must manipulate the flue environment with very fine damper control.”

“冷的氧气会漏进去炉子，然后集聚在炉里面的比较低的部位。这些氧气使火炬温度上升，因此会造成更多氧化氮。因为在怎么样堵住这些漏洞，还是会有些漏洞，用很准确的风门执行器来调整烟道环境很重要。”

爐子氣流供應和執行器

“To maintain a steady state at the burner, a furnace damper might move 600-2000 times a day to accommodate temperature swings.”

“为了保持燃烧机的稳定工作，炉子的风门执行器可能一天以内要600-2000次换风门开度设定来应付温度变化。”

炉子气流供应和执行器

“In order to provide accurate control of the damper blade, it is imperative that damper drives respond to 1/4% and 1/2% demand signal changes.”

“为了提供准确风门叶片的控制，风门执行器一定要能够符合1/4% and 1/2%操作员指定的信号变化。”

燃料成分不稳定的时候

"Because the fuel composition can change minute to minute, you need more or less air at any given moment."

“因为燃料的成分一分钟以内可能会发生变化，空气需要突然间会变。”

燃料成分不稳定的时候

“With tight damper control and a tightly sealed furnace, a clever operator could maintain his oxygen levels as low as possible, maybe down to 1.5% or 2 % O₂. That lowers the NO_x levels even further and less fuel is consumed.”

“假如工厂有准确风门控制以及炉子有良好密封，精明的操作员能维持氧化量在1.5%或2%左右的很低水平。这么低的氧气量会更减少燃料消耗以及氧化氮排量。”



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氧化氮排量和K牌风门执行器的影响

Quotations from:

Ian McLellan, SNC-Lavalin mechanical engineer

以下的引文由：

约翰·麦克乐兰，加拿大SNC-Lavalin
机械工程师

氧化氮排量和K牌风门执行器的影响

" With the TYPE K damper drives, the stability of NOx emission reductions improved tremendously. Before the process used to wander around a lot. "

“我们安装好K牌之后发现我们的氧化氮排放量的稳定性有很大的改进。过去我们的排量变化很大。”

氧化氮排量 and **K**牌风门执行器的影响

“Essentially, we run at approximately 7% excess air, so plus or minus 1.5% meant you could swing from 5.5-8.5%. (Before Type K.) But now repeatability is on the order of 0.1-0.25% a big improvement.”

“原则上我们应该维持7% 过剩空气，所以我们的供气量 $\pm 1.5\%$ 情况的意思是我们的实际过剩空气在5.5-8.5%的范围。（安装**K**牌前）我们现在情况有很大的改进，在 $\pm 0.1-0.25\%$ 。”

氧化氮排量 and K牌风门执行器的影响

"I also expect the TYPE K to perform well for a long time. It's got a lot of robust features. For instance it has an energized seal with stainless steel backing finger and a low-friction coated interior, so there will be very low wear on the actuator. "

“我估计K牌能长久有效工作。这个产品有很多耐用性的特色。譬如活力密封圈。密封圈后面有不锈钢底座。执行器里涂减少摩擦的表面处理材料。因此执行器不太容易受磨损。”

氧化氮排量和K牌风门执行器的影响

"Additionally, air pressure is applied to both sides of the vane, so there is no backlash. the positioner basically holds the damper at desired set point without drifting."

“另一个特色是，叶片的两面都有气压。所以不会有反冲。执行器能够完全控制风门的开度，不回有任何波动。”

美国电力 (AEP) 珀肯 (Pirkey) 一号机组

- » 高水分和灰份的德克萨斯褐煤 High Moisture and Ash Content Texas Lignite
- » 低发热量 Low Heating Value of 6500 Btu/lb (13,700 kJ/kg)
- » ABT 第二代弯管式燃烧器, 极低的氮氧化物水平 0.15 lb/MMBtu (220 mg NOx/Nm³)
- » 与中国的劣质煤相似, 磨损问题得以解决 Erosion
- » 火焰很稳定, 明亮 Improved Flame Conditions and Excellent Turndown Capability
- » 改造前喉部附近燃烧不稳定, 在煤粉着火之前有 1.8 – 2.4 米的煤粉带 There was generally a 6 – 8 ft (1.8 – 2.4 m) coal skirt developed prior to initiation of combustion.
- » 美国第一例成功改造燃用低劣褐煤的低 NOx 燃烧器的案例 Highly Successful Retrofit by ABT at Pirkey is the First of Its Kind in the U.S.



燃烬风喷口关闭OFA Ports Closed



燃烬风喷口打开OFA Ports Open

美国电力公司—珀肯厂

工厂对电动风门执行器很不满意。23部超热管和回热管风门执行器换K牌。

(另外上AM气流检测仪器)

提供风门准确控制

增加厂的热效率

美国电力公司—珀肯厂

“Since 1997, when we put in the new damper drives (Type K), I don’t recall one trouble ticket. We’ve never done any work on them.” David Wooten
Maintenance Supervisor, 2003.

“自从1997年安装新的风门执行器（K牌）我想不出任何时候我们需要写这些产品的故障/或保养报告。我们从来也没碰过这些仪器。”

大衛·沃頓— 保养组主任，2003年。



Type K—World Leader in Pneumatic Damper Drive Technology

美国K牌—世界领先压缩空气风门执行器技术

顺利更换K牌风门执行器

